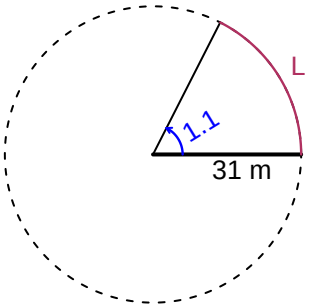
Name: Date:

Trig Final (SLTN v687)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 1.1 radians. The radius is 31 meters. How long is the arc in meters?

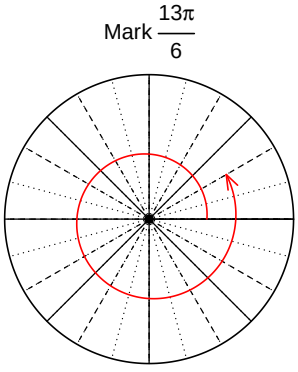


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

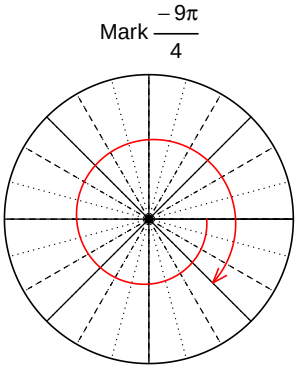
$L = 34.1$ meters.

Question 2

Consider angles $\frac{13\pi}{6}$ and $\frac{-9\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{13\pi}{6}\right)$ and $\sin\left(\frac{-9\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\cos(13\pi/6)$



Find $\sin(-9\pi/4)$

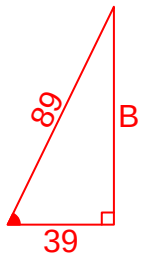
$\cos(13\pi/6) = \frac{\sqrt{3}}{2}$

$\sin(-9\pi/4) = \frac{-\sqrt{2}}{2}$

Question 3

If $\cos(\theta) = \frac{-39}{89}$, and θ is in quadrant II, determine an exact value for $\sin(\theta)$.

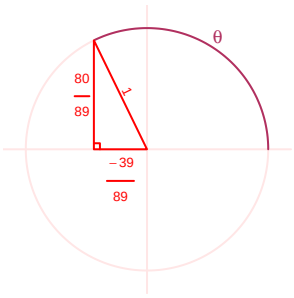
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$39^2 + B^2 = 89^2$$
$$B = \sqrt{89^2 - 39^2}$$
$$B = 80$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\sin(\theta) = \frac{80}{89}$$

Question 4

A mass-spring system oscillates vertically with an amplitude of 2.79 meters, a frequency of 8.5 Hz, and a midline at $y = -7.03$ meters. At $t = 0$, the mass is at the midline and moving down. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -2.79\sin(2\pi 8.5t) - 7.03$$

or

$$y = -2.79\sin(17\pi t) - 7.03$$

or

$$y = -2.79\sin(53.41t) - 7.03$$